Claim Amendments

Please amend claims 1-18, 21-46, cancel claims 19-20, and add new claims 47-48 as follows:

1. (currently amended) A working end of ~~a surgical~~ an electrosurgical probe for delivering energy to tissue, comprising:

a ~~member defining an engagement plane~~ tissue-engaging surface for engaging tissue and delivering energy to tissue;

a ~~medial portion comprising a material that is variably~~ variable electrical resistive body, ~~said medial portion extending inwardly from~~ at an interior of said ~~engagement plane~~ tissue-engaging surface; and

~~an interior conductive portion at an interior of the member coupled to said medial conductive portion~~ wherein the body provides low resistance electrical current paths from an interior conductor portion of the body to said tissue-engaging surface when the body is at a first temperature, and wherein the body displays increased resistance electrical current paths from said interior to said tissue-engaging surface when the body is at a selected higher temperature.

2. (currently amended) The working end of Claim 1 further comprising an electrical source operatively coupled to said interior ~~conductive~~ conductor portion of the body.

3. (currently amended) The working end of Claim 1 wherein said ~~engagement surface is an exterior of said medial portion~~ tissue-engaging surface is at least partly a thin-film electrically conductive material.

4. (currently amended) The working end of Claim 1 wherein the ~~medial portion has an~~ body comprises an electrically non-conductive material doped with an electrically conductive doping composition distributed therein to provide a positive temperature coefficient body wherein the electrical resistance of the body increases ~~that increases~~ with an increase in temperature ~~thereof~~ of the body.

5. (currently amended) The working end of Claim 1 wherein the ~~medial portion has an~~ body comprises an electrically non-conductive material doped with an electrically conductive doping composition distributed therein to provide a negative temperature coefficient body wherein the electrical resistance of the body decreases ~~that decreases~~ with an increase in temperature ~~thereof~~ of the body.

6. (currently amended) The working end of Claim 4 ~~5~~ wherein ~~medial portion defines a switching range at which its electrical resistance substantially increases or decreases in a selected temperature range~~ electrically conductive doping composition comprises carbon particles.

7. (currently amended) The working end of Claim ~~6~~ 1 wherein said ~~switching range falls~~ selected higher temperature ranges between about 40° C. and 200° C.

A1 cont'

8. (currently amended) The working end of Claim 1 wherein the ~~medial portion~~ body is a ceramic material with an electrically conductive doping composition distributed therein.

9. (currently amended) The working end of Claim 1 wherein the ~~conductive portion~~ body is a ~~flexible~~ resilient material with an electrically conductive doping composition distributed therein.

10. (currently amended) The working end of Claim 1 wherein the ~~medial portion~~ body is of a compressible material with an electrically conductive doping composition distributed therein.

11. (currently amended) The working end of Claim 10 wherein the ~~medial portion~~ body comprises a silicone polymer doped with a conductive composition.

12. (currently amended) The working end of Claim 10 wherein the ~~medial portion~~ body varies in electrical resistance in response to pressure applied thereto.

13. (currently amended) The working end of Claim 1 wherein the ~~engagement plane~~ body carries a thin-film metallic coating.

14. (currently amended) The working end of Claim ~~1~~ 13 wherein said ~~engagement plane~~ thin-film metallic coating extends 360° about the tissue-engaging surface of ~~the member~~ a needle-like working end.

15. (currently amended) The working end of Claim ~~1~~ 14 wherein said ~~engagement plane~~ thin-film metallic coating extends about only a portion of the ~~member~~ working end.

A1 cont.

16. (currently amended) A method for controlled application of energy to a targeted tissue, comprising the steps of:

providing a probe with a working end of a variable electrical resistive body having a tissue-engaging surface ~~engagement portion,~~ a ~~variably resistive portion~~, and at least one interior conductor ~~conductive portion~~ coupled to a voltage source, wherein the body provides low resistance electrical current paths from said at least one interior conductor to said tissue-engaging surface when the body is at a first temperature, and wherein the body displays increased resistance electrical current paths from said at least one interior conductor to said tissue-engaging surface when the body is at a selected higher temperature;

positioning said tissue-engaging surface ~~engagement portion~~ in contact with the targeted tissue; and

delivering Rf energy to said at least one interior conductor ~~conductive portion~~ thereby causing ohmic heating in said tissue wherein energy application to said tissue through said tissue-engaging surface is modulated by changes in resistance of said ~~variably resistive portion~~ variable electrical resistive body in response to temperature changes therein.

17. (currently amended) The method of Claim 16 wherein the ~~variably resistive portion~~ variable electrical resistive body defines a switching range in which its ~~resistivity~~ electrical resistance increases to terminate current flow through local portions thereof ~~is altered~~

~~substantially~~ at a pre-selected temperature, and the delivering step comprises the step ~~of reducing or eliminating~~ terminating Rf heating of tissue in any time interval that said ~~variably resistive portion~~ variable electrical resistive body is at or above said switching range.

18. (currently amended) The method of Claim 16 further comprising the step of applying energy to the targeted tissue by means of conduction of heat through the ~~engagement~~ tissue-engaging surface ~~portion~~ from said ~~variably resistive and conductive portions~~ variable electrical resistive body.

19. (canceled)

20. (canceled)

A1 cont.

21. (currently amended) A surgical probe for delivering energy to tissue, comprising:

an elongated probe having a working end body ~~that defines an engagement plane~~ with a tissue-engaging surface for contacting tissue;

the body ~~a layer portion inward of said engagement plane~~ comprising an electrically non-conductive material ~~having a thermally sensitive~~ doped with an electrically conductive doping composition distributed therein to provide variable resistance to electrical current flow therethrough, wherein the body provides a multiplicity of low resistance electrical current paths therethrough at a first temperature, and wherein the body provides increased resistance electrical current paths therethrough when the body is at a pre-selected higher temperature; and

~~at least one~~ an interior electrode having a first polarity carried in the interior of said body, said ~~working end~~ interior electrode operatively connected to a voltage source.

22. (canceled)

22. (currently amended) The working end of Claim 21 wherein said ~~engagement plane~~ tissue-engaging surface carries ~~an~~ a surface electrode having a second opposing polarity.

23. (currently amended) The working end of Claim 21 wherein the body carries first and second polarity electrodes ~~in the working end are~~ spaced apart by an intermediate ~~portion having a thermally sensitive resistance~~ body of an electrically non-conductive material doped with an electrically conductive doping composition distributed therein to provide variable resistance to electrical current flow therethrough.

24. (currently amended) The working end of surgical probe of Claim 21 wherein said ~~material having a thermally sensitive resistance~~ body of an electrically non-conductive material doped with an electrically conductive doping composition distributed therein is selected from the class of materials consisting of positive temperature coefficient materials and negative temperature coefficient materials.

A1 cont'

25. (currently amended) The working end of Claim 21 wherein said ~~material having a thermally sensitive resistance~~ body is a conductively doped foam.

26. (currently amended) The working end of Claim 22 wherein said ~~material having a thermally sensitive resistance~~ body is a conductively doped silicone.

27. (original) The working end of Claim 26 wherein said conductively doped silicone has an open cell structure.

28. (currently amended) The working end of Claim 21 wherein said ~~material having a thermally sensitive resistance~~ body is a conductively doped zirconium oxide.

29. (currently amended) The working end of Claim 21 wherein ~~layer portion~~ said body defines a gradient of ~~thermally sensitive~~ electrical resistance across ~~a selected dimension thereof~~ the tissue-engaging surface .

30. (currently amended) The surgical probe of Claim 21 wherein the working end body has a linear configuration.

31. (currently amended) The surgical probe of Claim 21 wherein the working end body defines at least one radius of curvature.

32. (currently amended) The surgical probe of Claim 21 wherein the working end body has a helical configuration.

33. (original) The surgical probe of Claim 21 further comprising an independent cutting electrode at a distal tip of the working end.

34. (currently amended) The working end of Claim 27 further comprising a fluid source coupled to said open cell ~~compressible~~ material for delivering fluid thereto.

35. (currently amended) A surgical probe for delivering energy to tissue, comprising:

an elongated probe having a working end body ~~that defines an engagement plane~~ with a tissue-engaging surface for contacting tissue;

an outer portion of the body ~~portion extending inward of said engagement plane that comprises~~ comprising a material having a resistance to electrical flow therethrough that varies substantially with pressure applied thereto; and

~~a conductive portion~~ an electrical conductor carried at an interior of the probe that is operatively connected to a voltage source.

36. (currently amended) The working end of Claim 35 further comprising ~~a medial~~ an intermediate body portion intermediate the outer portion and the electrical conductor, the intermediate body portion of a material having a resistance to electrical flow therethrough that varies substantially with temperature~~, said medial body portion extending inward of said outer body portion~~.

37. (currently amended) The working end of Claim 35 wherein said outer portion of the body ~~portion~~ has a resistance to electrical flow therethrough that decreases with pressure applied thereto.

38. (currently amended) The working end of Claim 35 wherein said outer portion of the body ~~portion~~ has a resistance to electrical flow therethrough that increases with pressure applied thereto.

39. (currently amended) The working end of Claim 35 wherein said outer portion of the body ~~portion~~ is an open cell sponge-type material.

40. (currently amended) The working end of Claim 39 further comprising a fluid source coupled to said ~~an~~ open cell sponge-type material for providing fluid flow thereto.

41. (currently amended) The working end of Claim 35 wherein said outer portion of the body ~~portion~~ is a closed cell sponge-type material.

42. (currently amended) The working end of Claim 35 further comprising ~~an exterior~~ a thin film conductive layer ~~carries~~ carried about an exterior portion of said working end.

43. (currently amended) A surgical probe for delivering energy to tissue, comprising:

a probe body having a working end ~~that defines an engagement plane~~ with a tissue-engaging surface for contacting tissue;

a first body portion inward of said ~~engagement plane~~ tissue-engaging surface comprising a positive temperature coefficient material having ~~a~~ an electrical resistance that increases substantially ~~varies with~~ at a pre-selected temperature;

a second body portion comprising a material that ~~has a selected substantial~~ that is a resistive heating element; and

at least one ~~conductive body portion~~ electrical conductor at the interior of the body operatively connected to a voltage source.

44. (currently amended) The working end of Claim 43 wherein said second body portion and said at least one ~~conductive body portion~~ electrical conductor are operatively connected in series to a voltage source

45. (currently amended) A surgical probe for delivering energy to tissue, comprising:

an elongated probe having a working end ~~that defines an engagement plane~~ with a tissue-engaging surface for contacting tissue;

a body portion inward of said ~~engagement plane~~ tissue-engaging surface comprising a material that ~~is variably resistive to electrical current flow therethrough~~ comprises a variable electrical resistive body;

means for varying the resistance of said body portion; and

at least one electrode carried ~~in said~~ at the interior of the working end operatively connected to a voltage source.

46. (currently amended) The working end of Claim 45 wherein said means for varying the resistance of said variable electrical resistive body ~~portion~~ is selected from the class consisting of direct current energy application means and photonic energy application means.

47. (new) A method for controlled application of energy to a targeted tissue, comprising the steps of:

providing a probe with a working end comprising a resilient surface layer of a variable electrical resistive material and an interior conductor coupled to a voltage source, wherein the resilient surface layer provides low electrical conductivity therethrough from the interior conductor to a tissue-engaging exterior of the resilient surface layer, and wherein resilient surface layer provides high electrical conductivity therethrough from the interior conductor to said tissue-engaging exterior when the resilient layer is compressed;

placing said tissue-engaging surface in contact with the targeted tissue; and

delivering Rf energy to the interior conductor thereby causing ohmic heating in the targeted tissue wherein energy application through the resilient surface

layer is modulated by changes in resistance of said resilient layer in response to pressure of the resilient layer against the targeted tissue.

A7 cont.

48. (new) An electrosurgical probe for delivering energy to tissue comprising a probe with a handle end and a working end, the working end carrying an interior electrical conductor covered with a surface layer of a pressure variable resistor ink.

Clean version

1. A working end of an electrosurgical probe for delivering energy to tissue, comprising:

a tissue-engaging surface for engaging tissue and delivering energy to tissue;

a variable electrical resistive body at an interior of said tissue-engaging surface; and

wherein the body provides low resistance electrical current paths from an interior conductor portion of the body to said tissue-engaging surface when the body is at a first temperature, and wherein the body displays increased resistance electrical current paths from said interior to said tissue-engaging surface when the body is at a selected higher temperature.

2. The working end of Claim 1 further comprising an electrical source operatively coupled to said interior conductor portion of the body.

3. The working end of Claim 1 wherein said tissue-engaging surface is at least partly a thin-film electrically conductive material.

4. The working end of Claim 1 wherein the body comprises an electrically non-conductive material doped with an electrically conductive doping composition distributed therein to provide a positive temperature coefficient body wherein the electrical resistance of the body increases with an increase in temperature of the body.

5. The working end of Claim 1 wherein the body comprises an electrically non-conductive material doped with an electrically conductive doping composition distributed therein to provide a negative temperature coefficient body wherein the electrical resistance of the body decreases with an increase in temperature of the body.

6. The working end of Claim 4 wherein electrically conductive doping composition comprises carbon particles.

7. The working end of Claim 1 wherein said selected higher temperature ranges between about 40° C. and 200° C.

8. The working end of Claim 1 wherein the body is a ceramic material with an electrically conductive doping composition distributed therein.

9. The working end of Claim 1 wherein the body is a resilient material with an electrically conductive doping composition distributed therein.

10. The working end of Claim 1 wherein the body is of a compressible material with an electrically conductive doping composition distributed therein.

11. The working end of Claim 10 wherein the body comprises a silicone polymer doped with a conductive composition.

12. The working end of Claim 10 wherein the body varies in electrical resistance in response to pressure applied thereto.

13. The working end of Claim 1 wherein the body carries a thin-film metallic coating.

14. The working end of Claim 13 wherein said thin-film metallic coating extends 360° about the tissue-engaging surface of a needle-like working end.

15. The working end of Claim 14 wherein said thin-film metallic coating extends about only a portion of the working end.

16. A method for controlled application of energy to a targeted tissue, comprising the steps of:

providing a probe with a working end of a variable electrical resistive body having a tissue-engaging surface, and at least one interior conductor coupled to a voltage source, wherein the body provides low resistance electrical current paths from said at least one interior conductor to said tissue-engaging surface when the body is at a first temperature, and wherein the body displays increased resistance electrical current paths from said at least one interior conductor to said tissue-engaging surface when the body is at a selected higher temperature;

positioning said tissue-engaging surface in contact with the targeted tissue; and

delivering Rf energy to said at least one interior conductor thereby causing ohmic heating in said tissue wherein energy application to said tissue through said tissue-engaging surface is modulated by changes in resistance of said variable electrical resistive body in response to temperature changes therein.

17. The method of Claim 16 wherein the variable electrical resistive body defines a switching range in which its electrical resistance increases to terminate current flow through local portions thereof at a pre-selected temperature, and the delivering step comprises the step terminating Rf heating of tissue in any time interval that said variable electrical resistive body is at or above said switching range.

18. The method of Claim 16 further comprising the step of applying energy to the targeted tissue by means of conduction of heat through the tissue-engaging surface from said variable electrical resistive body.

21. A surgical probe for delivering energy to tissue, comprising:

an elongated probe having a working end body with a tissue-engaging surface for contacting tissue;

the body comprising an electrically non-conductive material doped with an electrically conductive doping composition distributed therein to provide variable resistance to electrical current flow therethrough, wherein the body provides a multiplicity of low resistance electrical current paths therethrough at a first temperature,

and wherein the body provides increased resistance electrical current paths therethrough when the body is at a pre-selected higher temperature; and

an interior electrode having a first polarity carried in the interior of said body, said interior electrode operatively connected to a voltage source.

22. The working end of Claim 21 wherein said tissue-engaging surface carries a surface electrode having a second opposing polarity.

23. The working end of Claim 21 wherein first and second polarity electrodes spaced apart by an intermediate body of an electrically non-conductive material doped with an electrically conductive doping composition distributed therein to provide variable resistance to electrical current flow therethrough.

24. The working end of surgical probe of Claim 21 wherein said body of an electrically non-conductive material doped with an electrically conductive doping composition distributed therein is selected from the class of materials consisting of positive temperature coefficient materials and negative temperature coefficient materials.

25. The working end of Claim 21 wherein said body is a conductively doped foam.

26. The working end of Claim 22 wherein said body is a conductively doped silicone.

27. The working end of Claim 26 wherein said conductively doped silicone has an open cell structure.

28. The working end of Claim 21 wherein said body is a conductively doped zirconium oxide.

29. The working end of Claim 21 wherein said body defines a gradient of electrical resistance across the tissue-engaging surface .

30. The surgical probe of Claim 21 wherein the working end body has a linear configuration.

31. The surgical probe of Claim 21 wherein the working end body defines at least one radius of curvature.

32. The surgical probe of Claim 21 wherein the working end body has a helical configuration.

33. The surgical probe of Claim 21 further comprising an independent cutting electrode at a distal tip of the working end.

34. The working end of Claim 27 further comprising a fluid source coupled to said open cell material for delivering fluid thereto.

35. A surgical probe for delivering energy to tissue, comprising:

an elongated probe having a working end body with a tissue-engaging surface for contacting tissue;

an outer portion of the body comprising a material having a resistance to electrical flow therethrough that varies substantially with pressure applied thereto; and

an electrical conductor carried at an interior of the probe that is operatively connected to a voltage source.

36. The working end of Claim 35 further comprising an intermediate body portion intermediate the outer portion and the electrical conductor, the intermediate body portion of a material having a resistance to electrical flow therethrough that varies substantially with temperature.

37. The working end of Claim 35 wherein said outer portion of the body has a resistance to electrical flow therethrough that decreases with pressure applied thereto.

38. The working end of Claim 35 wherein said outer portion of the body has a resistance to electrical flow therethrough that increases with pressure applied thereto.

39. The working end of Claim 35 wherein said outer portion of the body is an open cell sponge-type material.

40. The working end of Claim 39 further comprising a fluid source coupled to said open cell sponge-type material for providing fluid flow thereto.

41. The working end of Claim 35 wherein said outer portion of the body is a closed cell sponge-type material.

42. The working end of Claim 35 further comprising a thin film conductive layer carried about an exterior portion of said working end.

43. A surgical probe for delivering energy to tissue, comprising:

a probe body having a working end with a tissue-engaging surface for contacting tissue;

a first body portion inward of said tissue-engaging surface comprising a positive temperature coefficient material having ~~a~~ an electrical resistance that increases substantially at a pre-selected temperature;

a second body portion comprising a material that that is a resistive heating element; and

at least one electrical conductor at the interior of the body operatively connected to a voltage source.

44. The working end of Claim 43 wherein said second body portion and said at least one electrical conductor are operatively connected in series to a voltage source

45. A surgical probe for delivering energy to tissue, comprising:

an elongated probe having a working end with a tissue-engaging surface for contacting tissue;

a body portion inward of said tissue-engaging surface comprising a material that comprises a variable electrical resistive body;

means for varying the resistance of said body portion; and

at least one electrode carried at the interior of the working end operatively connected to a voltage source.

46. The working end of Claim 45 wherein said means for varying the resistance of said variable electrical resistive body is selected from the class consisting of direct current energy application means and photonic energy application means.

47. A method for controlled application of energy to a targeted tissue, comprising the steps of:

providing a probe with a working end comprising a resilient surface layer of a variable electrical resistive material and an interior conductor coupled to a voltage source, wherein the resilient surface layer provides low electrical conductivity therethrough from the interior conductor to a tissue-engaging exterior of the resilient surface layer, and wherein resilient surface layer provides high electrical conductivity therethrough from the interior conductor to said tissue-engaging exterior when the resilient layer is compressed;

placing said tissue-engaging surface in contact with the targeted tissue; and

delivering Rf energy to the interior conductor thereby causing ohmic heating in the targeted tissue wherein energy application through the resilient surface layer is modulated by changes in resistance of said resilient layer in response to pressure of the resilient layer against the targeted tissue.

48. An electrosurgical probe for delivering energy to tissue comprising a probe with a handle end and a working end, the working end carrying an interior electrical conductor covered with a surface layer of a pressure variable resistor ink.